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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,115	02/01/2002	Peter Jivan Shah	020103	6021
23696	7590	05/12/2006	EXAMINER	
QUALCOMM, INC 5775 MOREHOUSE DR. SAN DIEGO, CA 92121			BHATTACHARYA, SAM	
			ART UNIT	PAPER NUMBER
			2617	

DATE MAILED: 05/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/066,115

Applicant(s)

SHAH, PETER JIVAN

Examiner

Sam Bhattacharya

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 47-97 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 47-97 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/13/06 has been entered.

### ***Claim Rejections - 35 USC § 102***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 47-72, 75, 78 and 81-93, 95 and 96 are rejected under 35 U.S.C. 102(e) as being anticipated by Faulkner (U.S. Patent 6,606,484).

Regarding claim 47, Faulkner discloses a circuit including a compensation branch 5 for reducing second order non-linear distortion in a receiver 3, 8 caused by jammers during direct down conversion of a received RF signal by the receiver, the compensation branch being adapted to be coupled to the receiver to reproduce the second order nonlinear distortion (intermodulation interference) in the receiver (see col. 3, lines 52-67 and col. 5, lines 5-10) and including a squaring circuit 6 for receiving the received RF signal and generating a squared version of the received RF signal, a gain stage 7 for receiving the squared version of the received RF signal and generating the reproduced second order nonlinear distortion (see col. 3, lines 43-52), and an output coupling circuit 10 or S for coupling the reproduced second order nonlinear distortion to

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an output of the receiver to generate a down-converted baseband signal characterized with reduced second order nonlinear distortion (see col. 4, lines 1-19).

Regarding claim 48, Faulkner discloses that the receiver includes a mixer 3, and the output coupling circuit couples the reproduced second order nonlinear distortion to an output of the mixer. See FIG. 1.

Regarding claims 49 and 50, Faulkner discloses that the receiver is a zero-IF or a low-IF direct down conversion receiver. See col. 1, lines 42-47.

Regarding claim 51, Faulkner discloses that the output coupling circuit is an adder. See col. 4, lines 1-19 and col. 5, lines 22-36.

Regarding claims 52-56, Faulkner discloses that the receiver includes a mixer, the squaring circuit is part of the mixer and the stage receives the squared version of the received RF signal from the mixer. See col. 3, lines 43-62.

Regarding claims 57-59 and 61, Faulkner discloses that the receiver defines a receiver path and the compensation path operates to provide feed forward second order nonlinear distortion reduction to the receiver path.

Regarding claims 60 and 62, Faulkner discloses that the nonlinear distortion elimination does not introduce other nonlinear distortion in the receiver path.

Regarding claims 63-71, Faulkner discloses calibration of the gain stage, including factory calibration and auto-calibration. See col. 1, lines 28-42, col. 4, lines 20-32, col. 5, lines 49-62, and col. 6, lines 10-34.

Regarding claims 72, 75 and 78, Faulkner discloses that the circuit and receiver are on a single integrated circuit. See col. 3, lines 52-67.

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Regarding claim 81, Faulkner discloses an integrated circuit having a receiver 3, 8 and a distortion reduction circuit 5 for reducing second order non-linear distortion in a receiver 3, 8 caused by jammers during direct down conversion of a received RF signal by the receiver, the distortion reduction circuit being adapted to be coupled to the receiver to reproduce the second order nonlinear distortion (intermodulation interference) in the receiver (see col. 3, lines 52-67 and col. 5, lines 5-10) and including a squaring circuit 6 for receiving the received RF signal and generating a squared version of the received RF signal, a gain stage 7 for receiving the squared version of the received RF signal and generating the reproduced second order nonlinear distortion (see col. 3, lines 43-52), and an output coupling circuit 10 or S for coupling the reproduced second order nonlinear distortion to an output of the receiver to generate a down-converted baseband signal characterized with reduced second order nonlinear distortion (see col. 4, lines 1-19).

Claim 82 incorporates the limitations of claims 49, 50 and 81, and is therefore rejected for the same reasons as claims 49, 50 and 81.

Regarding claims 83-85, Faulkner discloses calibration of the gain stage, including factory calibration and auto-calibration. See col. 1, lines 28-42, col. 4, lines 20-32, col. 5, lines 49-62, and col. 6, lines 10-34.

Regarding claim 86, Faulkner discloses an output coupling circuit 10 for subtracting the unwanted second order nonlinear distortion from an output of the receiver to generate a down-converted baseband signal characterized with reduced second order nonlinear distortion. See col. 3, lines 59-62.

Claim 87 incorporates the limitations of claims 49, 50 and 86, and is therefore rejected for the same reasons as claims 49, 50 and 86.

Regarding claims 88-90, Faulkner discloses calibration of the gain stage, including factory calibration and auto-calibration. See col. 1, lines 28-42, col. 4, lines 20-32, col. 5, lines 49-62, and col. 6, lines 10-34.

Regarding claim 91, Faulkner discloses subtracting, using a feed forward technique, the unwanted second order nonlinear distortion from an output of the receiver to generate a down-converted baseband signal characterized with reduced second order nonlinear distortion. See FIG. 1 and col. 4, lines 1-10.

Regarding claim 92, Faulkner discloses calibration of the gain stage. See col. 1, lines 28-42, col. 4, lines 20-32, col. 5, lines 49-62, and col. 6, lines 10-34.

Regarding claim 93, Faulkner discloses that the squared version of the received RF signal is internally generated by the mixer. See col. 3, lines 42-67.

Regarding claims 95 and 96, Faulkner discloses that the gain stage generates the second order nonlinear distortion with a variable gain that is temperature dependent. See col. 4, lines 20-37.

### ***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 73, 74, 76, 77, 79 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faulkner in view of Rahamim (US 5,541,990).

Regarding claims 73, 74, 76, 77, 79 and 80, Faulkner fails to specifically disclose that the circuit and receiver are coupled to a modem for signal processing of the down-converted signal and being responsive to a test signal generated under control of the modem to provide the calibration.

In an analogous art, Rahamim discloses a modem coupled to a receiver Rxin and which includes an integrated circuit in which distortion is reduced. See FIG. 3 and col. 3, lines 37-45. The integrated circuit is responsive to a test signal generated under control of the modem. See col. 4, lines 17-32. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Faulkner by including a modem and receiver coupling configuration taught by Rahamim so that the number of components in the circuit and receiver are reduced due to a signal processing and testing being controlled from outside the apparatus.

6. Claim 94 is rejected under 35 U.S.C. 103(a) as being unpatentable over Faulkner in view of Kimura (US 5,552,734).

Regarding claim 94, Faulkner fails to disclose that the mixer includes cross-coupled transistors, where the squared version of the received RF signal is internally generated at emitters of the transistors, and the reproduced second order nonlinear distortion is coupled to collectors of the transmitters.

However, in an analogous art, Kimura discloses a mixer 42 and squaring circuit 41 where the mixer includes cross-coupled transistors Q5 to Q8, where the squared version of the received RF signal is internally generated at emitters of the transistors, and the reproduced second order

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nonlinear distortion is coupled to collectors of the transmitters. See FIGS. 6 and 7, and col. 7, line 53 – col. 8, line 30. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Faulkner by incorporating the above-noted features in Kimura for the purpose of combining the operations of squaring and mixing in a single unit, thereby saving space in the apparatus.

7. Claim 97 is rejected under 35 U.S.C. 103(a) as being unpatentable over Faulkner in view of Marchesani et al. (US 5,883,551).

Regarding claim 97, Faulkner fails to disclose that the gain stage includes a DAC converter providing programmable gain for the reproduced second order nonlinear distortion.

However, in an analogous art, Marchesani discloses a system in which DAC converters 10 and 11 are part of a gain stage that includes variable gain amplifiers 12 and 13. See FIG. 1 and col. 1, lines 45-60. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Faulkner by incorporating the above-noted features in Marchesani for the purpose of performing analog calibration functions in the variable gain amplifier.



***Response to Arguments***

8. Applicant's arguments filed 2/22/06 have been fully considered but they are not persuasive.

Applicant states that Faulkner does not disclose a squaring circuit for receiving the received RF signal (a modulated carrier wave signal) and generating a squared version of the received RF signal.

Examiner respectfully disagrees, and points out that the claims do not recite that the received signal is a modulated RF carrier signal. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The recitation in the claims includes cases where the received RF signal is converted by later stages in the apparatus.

Faulkner also discloses that the output coupling circuit couples the reproduced second order nonlinear distortion to an output of the mixer, since the output coupling circuit is coupled to the output of mixer 3.

The combination of Faulkner and Rahamim is proper and one skilled in the art would have been motivated to combine these references to have signal processing and testing being controlled from outside the apparatus.

The test signals are generated in Rahamim so that the resistance of the matching resistor can be varied according to the internal DCR of the transformer. See col. 3, lines 46-63.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Bhattacharya whose telephone number is (571) 272-7917. The examiner can normally be reached on Weekdays, 9-6, with first Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Eng can be reached on (571) 272-7495. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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GEORGE ENG  
SUPERVISORY PATENT EXAMINER